LISTING OF CLAIMS

What is claimed is:

1. – 28 (Canceled)

29. (Previously Presented) A method for simulating a magnetoresistive memory device in an integrated circuit magnetoresistive random access memory (MRAM) having a first conductor, a second conductor, and a magnetic tunnel junction (MTJ), the first conductor disposed substantially orthogonal to the second conductor, the MTJ disposed between the first conductor and the second conductor, the method comprising:

calculating an indication of a first magnetic field applied to the MTJ, the first magnetic field generated by current in the first conductor;

calculating an indication of a second magnetic field applied to the MTJ, the second magnetic field generated by current in the second conductor;

detecting indications of transitions of the first magnetic field and the second magnetic field across one or more thresholds; and

providing a state machine having one or more state variables with transitions in the state machine being dependent upon detected indications of transitions of the first magnetic field and the second magnetic field and a state of the one or more state variables, wherein state variables of the state machine include at least three of:

a state variable indicative of a presence of the first magnetic field above a predetermined threshold;

a state variable indicative of a presence of the second magnetic field above a predetermined threshold;

a state variable indicative of a presence of the first magnetic field above a predetermined threshold preceding a presence of the second magnetic field above a predetermined threshold; and

a state variable indicative of a presence of the second magnetic field above a predetermined threshold preceding a presence of the first magnetic field above a predetermined threshold.

30. (Original) The method of claim 29 further comprising:

modeling a conductance value of the MTJ in each of two bit states by using an equation having an equivalent form of $G(A+BV+CV^2)$, where G is a conductance value of the MTJ, A, B, and C are zero, first, and second order voltage coefficient parameters, and V is a MTJ bias voltage value.

31. (Original) The method of claim 30 further comprising:

utilizing a first set of zero, first, and second order voltage coefficient parameters for the conductance value for a first bit state and utilizing a second set of zero, first, and second order voltage coefficient parameters for the conductance value for a second bit state.

32. (Original) The method of claim 30 further comprising

in at least one of the two bit states, utilizing a first set of zero, first, and second order voltage coefficient parameters for the conductance value for a positive MTJ bias voltage and utilizing a second set of zero, first, and second order voltage coefficient parameters for the conductance value for a negative MTJ bias voltage.

33. (Original) The method of claim 30 further comprising:

calculating A, B, and C as a function of temperature.

34. (Original) The method of claim 30 wherein values of G, A, B, and C are generated by a method comprising:

fitting low resistance state conductance data, high resistance state conductance negative bias voltage data, and high resistance state conductance positive bias voltage data for predetermined temperatures with second order polynomials; and

fitting individual polynomial coefficient parameters to first order temperature polynomials.

35. (Original) The method of claim 34 wherein the values of G, A, B, and C are generated by a method further comprising:

adjusting one or more of the individual polynomial coefficient parameters to minimize a total error being measured between the second order polynomials and each of the low resistance state conductance data, the high resistance state conductance negative bias voltage data, and the high resistance state conductance positive bias voltage data.

36. (Original) The method of claim 35 wherein the values of G, A, B, and C are generated by a method further comprising:

eliminating one or more of the polynomial coefficient parameters which have a minimal effect on error being measured.

37. (Canceled).

38. (Original) The method of claim 29 wherein the MTJ includes multiple free magnetic layers.

39. (Original) The method of claim 29 wherein the one or more thresholds include:

a first threshold corresponding to the first magnetic field exceeding a lower threshold while increasing;

a second threshold corresponding to the first magnetic field exceeding a higher threshold while increasing;

a third threshold corresponding to the second magnetic field exceeding a lower threshold while increasing;

a fourth threshold corresponding to the second magnetic field exceeding a upper threshold while increasing.

40. (Original) The method of claim 29 wherein:

the calculating an indication of a first magnetic field applied to the MTJ further includes calculating a first current in the first conductor;

the calculating an indication of a second magnetic field applied to the MTJ further includes calculating a second current in the second conductor.

41. (Canceled).